BOTANY

Plant Geography.— *The Scandinavian flora.* Several naturalists have considered the origin of the biota of the Scandinavian peninsula. During the glacial period most of the higher forms of life must have disappeared, leaving the peninsula to be repopulated by immigrants from other regions as the ice receded. This immigration was early thought to have had two sources: the central European lowlands and the Russo-Siberian region. The biota of the former is supposed to have come in by way of one or more Baltic land connections, and that of the latter is thought to have gained access by way of Finland and northwestern Russia. But besides these a third element, called by Blytt "the Atlantic group" of plants, was discerned, as the flora, especially of the western part, became better known.

This so-called "Altantic" element is discussed by Stejneger (*Smith. Misc. Coll.*, quart. iss., 3:458–513. 1907) from both the zoological and botanical sides. The term "Atlantic" he considers an unfortunate designation for those members of the fauna and flora which occur nowhere in Norway except along the coast between Stavanger and Kristianssund or where they may be shown to have been derived from this secondary center of distribution. This association shows a strong resemblance to the biota of Scotland and northwestern Ireland, and Stejneger thinks that the similarity is not due to parallel development but that it indicates a direct genetic connection between the two. The possibility of the immigration of this element from Scotland across the present expanse of water is considered and the author concludes that in addition to the arguments against this hypothesis offered by plants and lower animals, the presence of mammals offers a finally conclusive proof of a prior land connection between northern Scotland and western Norway. He thinks that certain geological considerations support this theory.

Endemic plants in Ceylon. Willis publishes important contributions to our knowledge of endemism (*Ann. Roy. Bot. Gard. Peradeniya* 3:271–302. 1906; 4:1–15. 1907). Ritigala is an isolated mountain in the north-central province of Ceylon, which, although of no great height, arises abruptly from the plains and forms the highest ground between the central mass of the Ceylon mountain system and the very similar hills of southern India. The nearest hills are forty miles to the

south and the intervening region is dry, and judging from the configuration of the region must always have been so for at least 25 miles of the distance. It is almost rainless except during the season of the eastern monsoon from September to December. The summit of the mountain, however, is bathed in mist and consequently affords an isolated "moist region" vegetation, practically confined to a few acres within 100 vertical feet of the summit which it must have reached by leaping at one bound over the intervening 40 miles of dry lowland that separate it from the Matale hills to the south or over the 280 miles that separate it from the hills of southern India.

A flora of 144 flowering plants and ferns is found at or near the summit. Of these, 41 belong to the dry region and consequently have not had to be transported forty miles to reach the summit. Of the 103 remaining species, 24 have in all probability been introduced by birds; and 49, of which 24 are ferns or lycopods, have evidently been brought by the wind. Thus only 30 remain whose method of introduction is doubtful; these Dr. Willis discusses in detail.

Bearing these facts in mind, we may now turn to the question of endemism. Of the 144 species and varieties of the flora of the summit, 13 are strictly endemic so far as is now known, and 1 other which may perhaps occur in the mountains of southern India, is provisionally added to the list. The distribution of these plants in the groups recognized above is as follows:

	Total	Endemic
Dry Zone Plants	41	1
Carried by Birds	24	1
Carried by Wind	49	3
Doubtful	30	9
	144	14

The conclusion to be drawn from these figures is that: "Endemism, other things being equal, goes in general with difficulty of distribution and with rare arrival at one spot." The author adduces arguments to show that the introduction of seed by birds would be much more common than that by wind, and that the arrival of seed of those forms which have been classed as doubtful would be the least likely of all. A new form arising from a stock which had reached the summit will be less likely to be swamped by crossing with the parent species if the latter arrives very infrequently. Among the dry zone plants the only endemic form belongs to a genus in which the seeds are extremely ill adapted to transportation over long distances. If difficulty of arrival be one of the conditions of endemism, one would expect to find the

greatest number of endemic forms related to species which are rare elsewhere, and this seems to be true in the case of this flora. Indeed it would seem that the endemic forms belong chiefly to families which show the largest number of endemics elsewhere in Ceylon.

In his second paper, Dr. Willis attempts to show that the differentiation of endemic species cannot be due to the action of natural selection on infinitesimal variations. The arguments are:—

The distinguishing characteristics cannot be shown to have any adaptive value. The endemic forms are often associated with the species from which they have probably been derived. They have not supplanted them as they would if evolved by the selection of special adaptations. The distribution of endemics is narrower than that demanded by their environmental conditions, and corresponds rather with that resulting from an origin by mutation.

In conclusion the author remarks:— "The evidence is not so absolutely in favor of mutation as it is against selection of infinitesimal variations, but at present the mutation theory is the only one in the field which can be invoked to explain the facts."

J. ARTHUR HARRIS

Lock on Progress in the Study of Variation, Heredity and Evolution.[1] — This attractive little volume contains two introductory chapters on the general conceptions of evolution, one on the theory of natural selection, one on biometry and one on the theory of mutation. The three chapters following these are devoted to a discussion of the results from investigations of hybridization. One of these is essentially an historical sketch of the work of the older hybridists. The two succeeding chapters treat of Mendelism, to the literature of which the author has already made valuable contributions. In chapter ten he discusses the bearing of recent cytological investigations upon the problems of heredity. A final chapter sums up and discusses the general bearing of the subjects treated.

That the author is a mutationist appears from even a casual reading of a few pages. The style is simple and for the most part very clear as are also the diagrams which serve as illustrations. A few excellent half tones, particularly the portraits of Darwin, Galton, DeVries, Kölreuter, and Mendel, add much to the attractiveness of the book. Possibly the author might have found a much more weighty quotation for his closing pages than one from Bernard Shaw.

[1] Lock, R. H. *Recent Progress in the Study of Variation, Heredity and Evolution.* London, John Murry, 1906. xiii + 299 pp.